

SFIG Question 5 Presentation

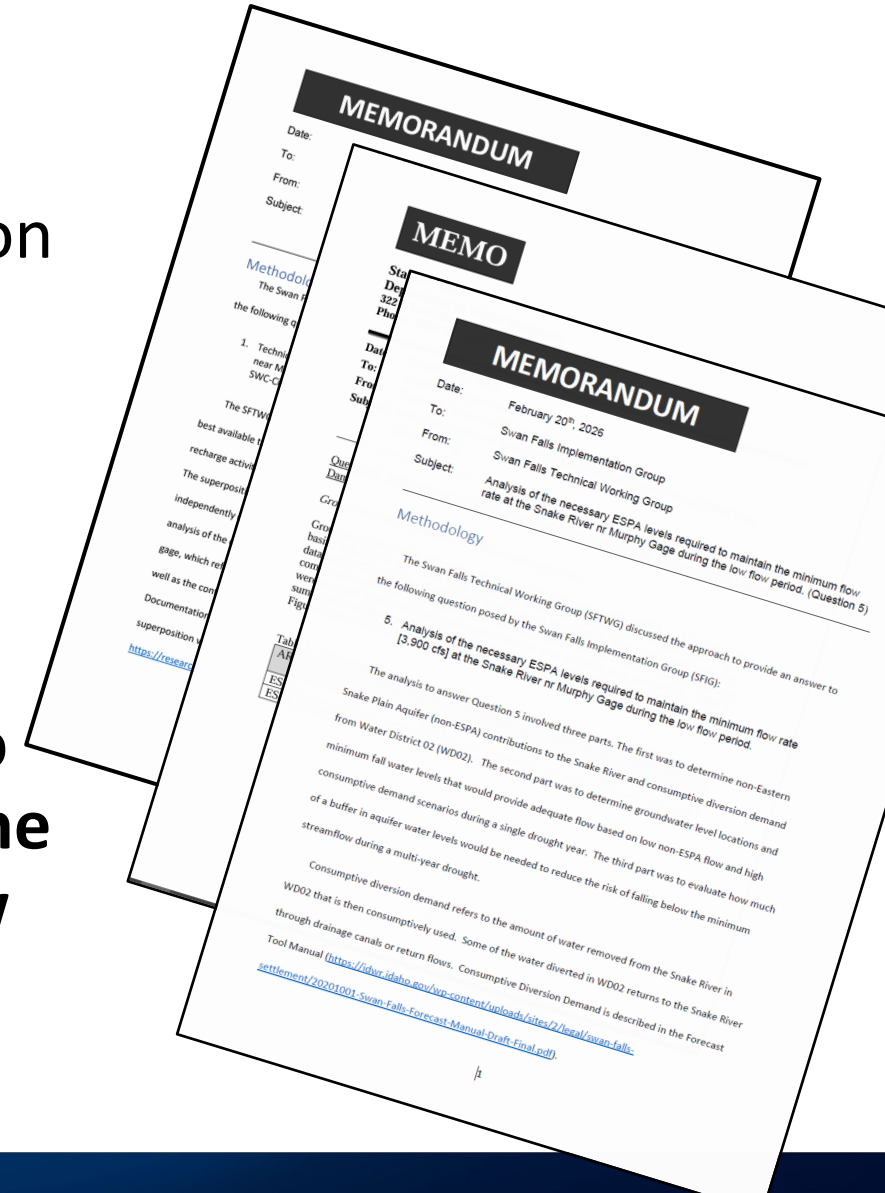
Presented by Jennifer Sukow and Ethan Geisler

March 24th, 2026

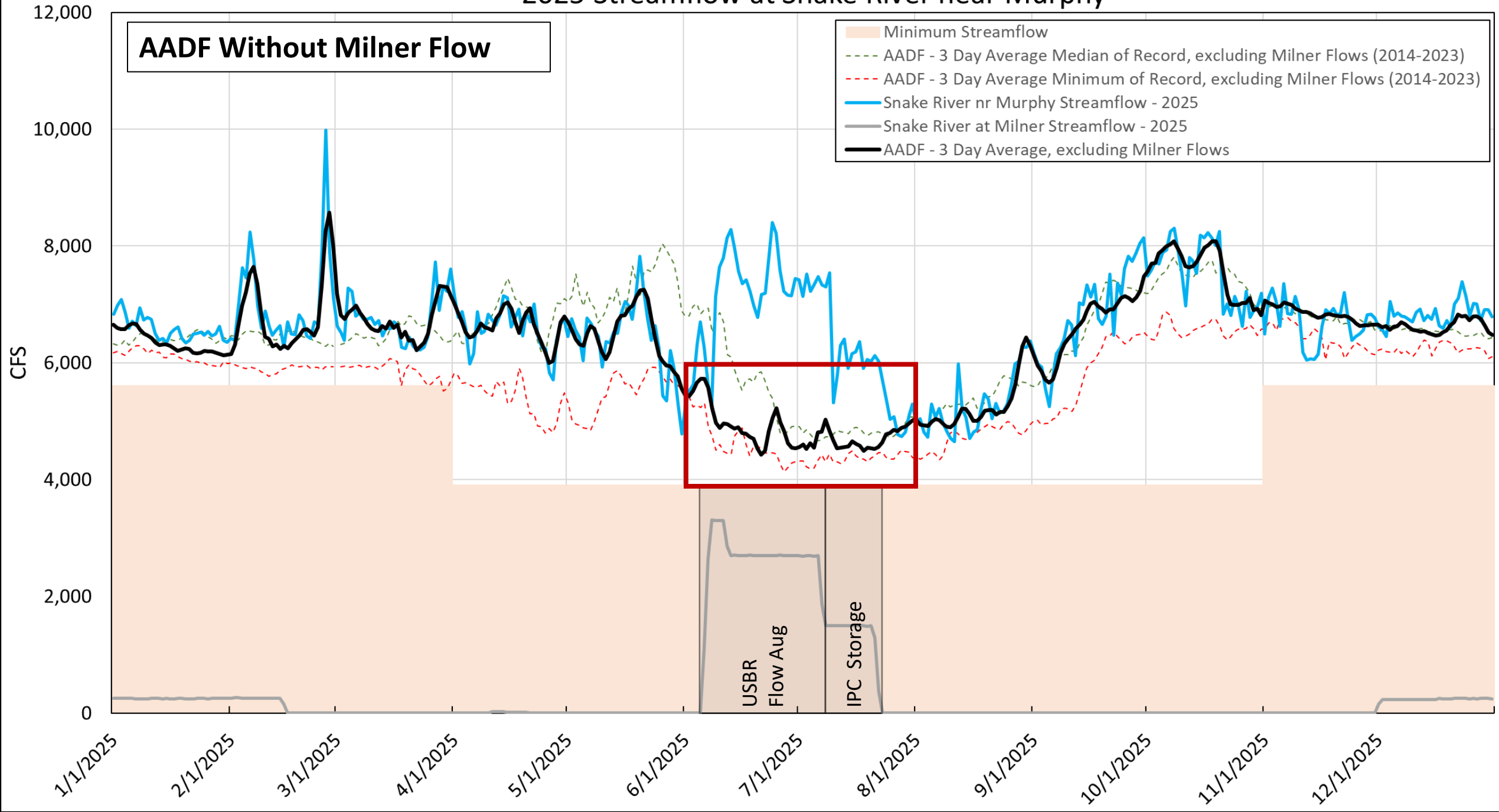


Recap of SFIG Questions

1. Impact of 2015 settlement & managed recharge on AADF minimums (since 2014)
2. Impact of ESPA groundwater trust rights
3. Impact of non-ESPA groundwater trust rights
4. Impact of surface water diversion trust right
5. **Analysis of the necessary ESPA levels required to maintain the minimum flow rate [3,900 cfs] at the Snake River nr Murphy Gage during the low flow period.**



2025 Streamflow at Snake River near Murphy



Non-ESPA Flow Components of Analysis

Snake River nr Murphy, ID

Consumptive Use

Northside Return Flow

Southside Return Flow

Explanation

- Milner to Murphy Reach
- Tributary Inflow
- Return Flows
- WD02 Diversions
- ESPA

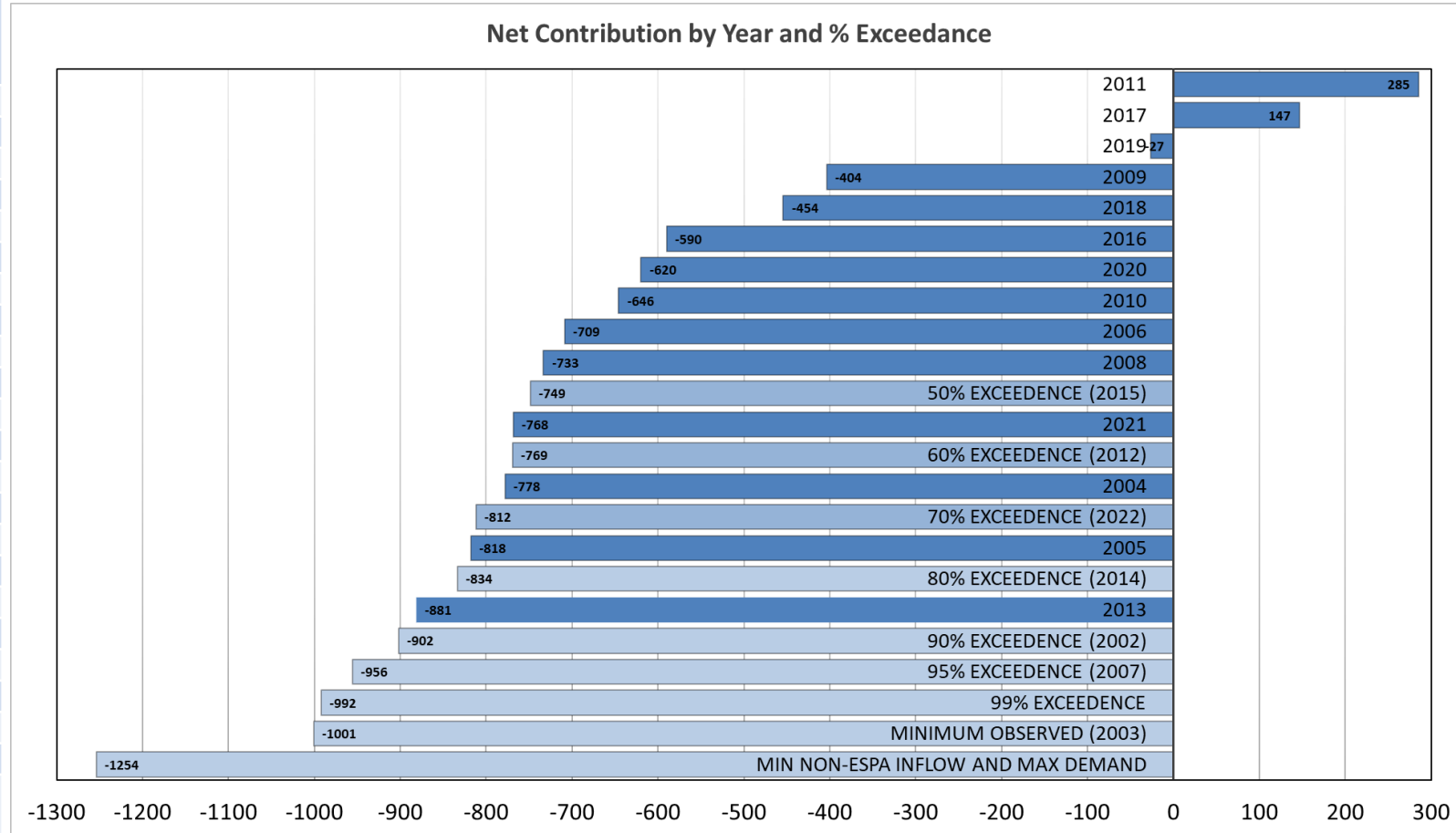


Swan Falls Technical Working Group Updates

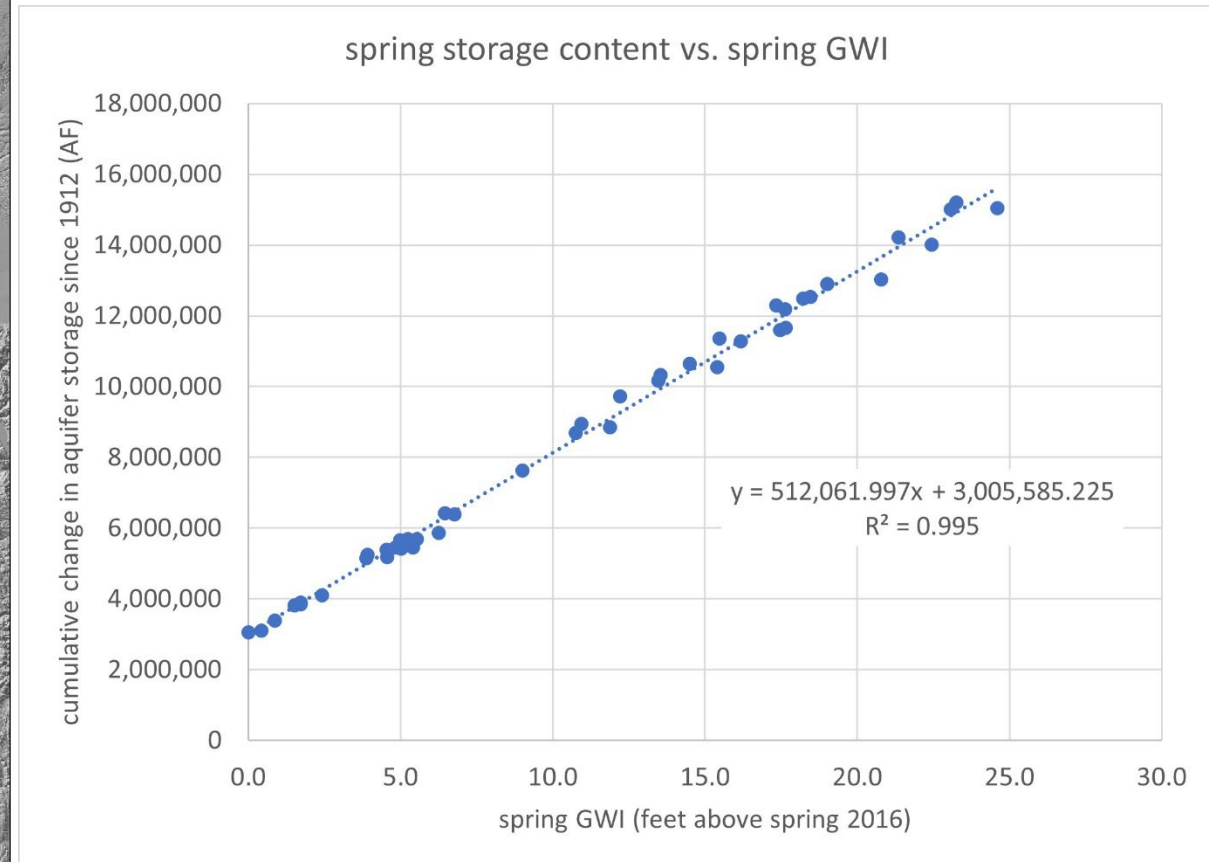
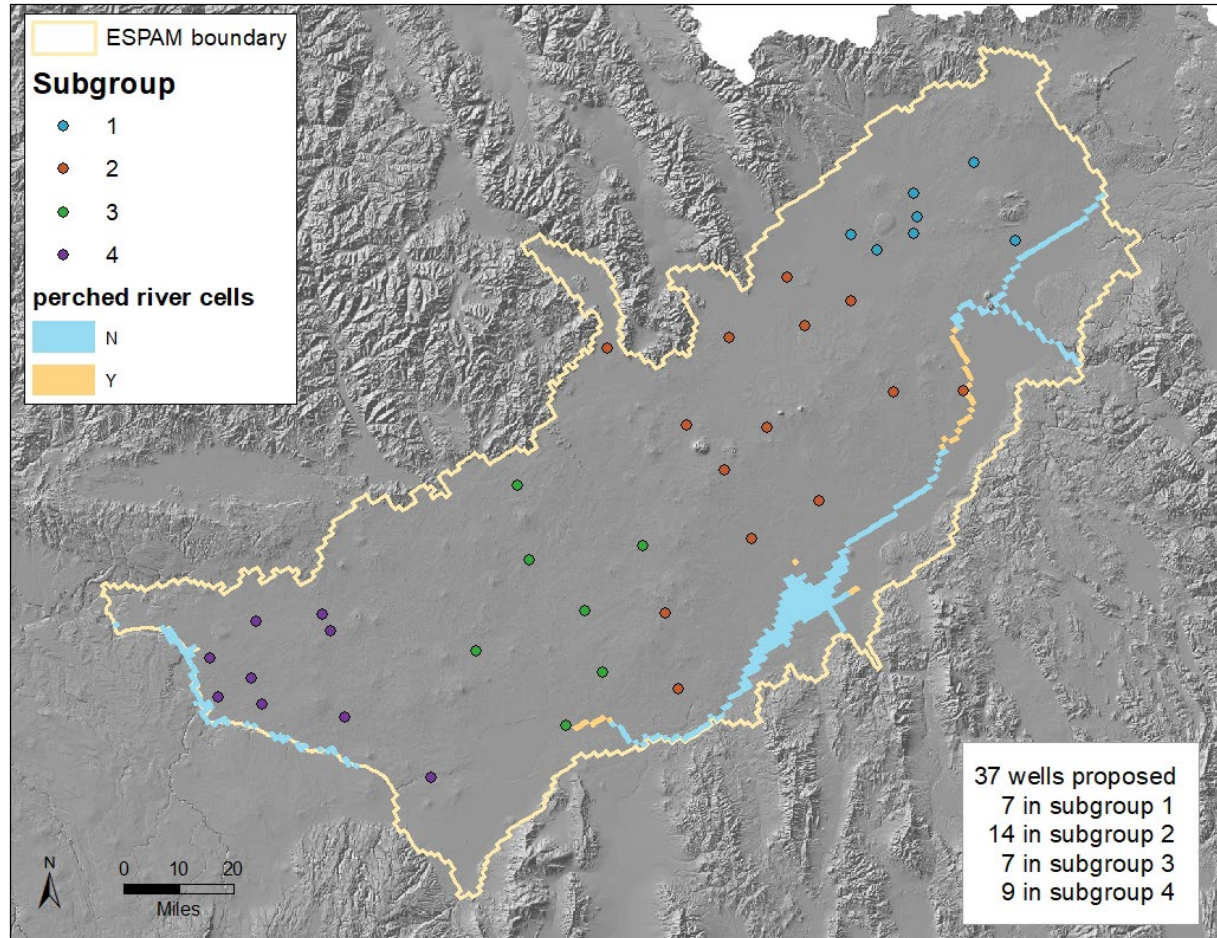
- *Question 5: “Analysis of the necessary ESPA levels required to maintain the minimum flow rate at the Snake River nr Murphy Gage during the low flow period”*
- Overview of methods:
 1. Evaluated non-ESPA contributions and Water District 02 consumptive demand to quantify ESPA discharge needed to maintain minimum streamflow
 2. Evaluated ESPA water levels needed in fall to maintain ESPA contribution to minimum streamflow for a single drought year
 3. Evaluated observed water level decline during multi-year droughts to inform potential goals for buffering against falling below minimum streamflow
- Overview of results:
 - A range of potential fall water level goals for SFIG to evaluate based on:
 1. acceptable level of risk during a single drought year
 2. number of successive drought years to buffer against

Non-ESPA Flow and Consumptive Demand Percent Exceedance

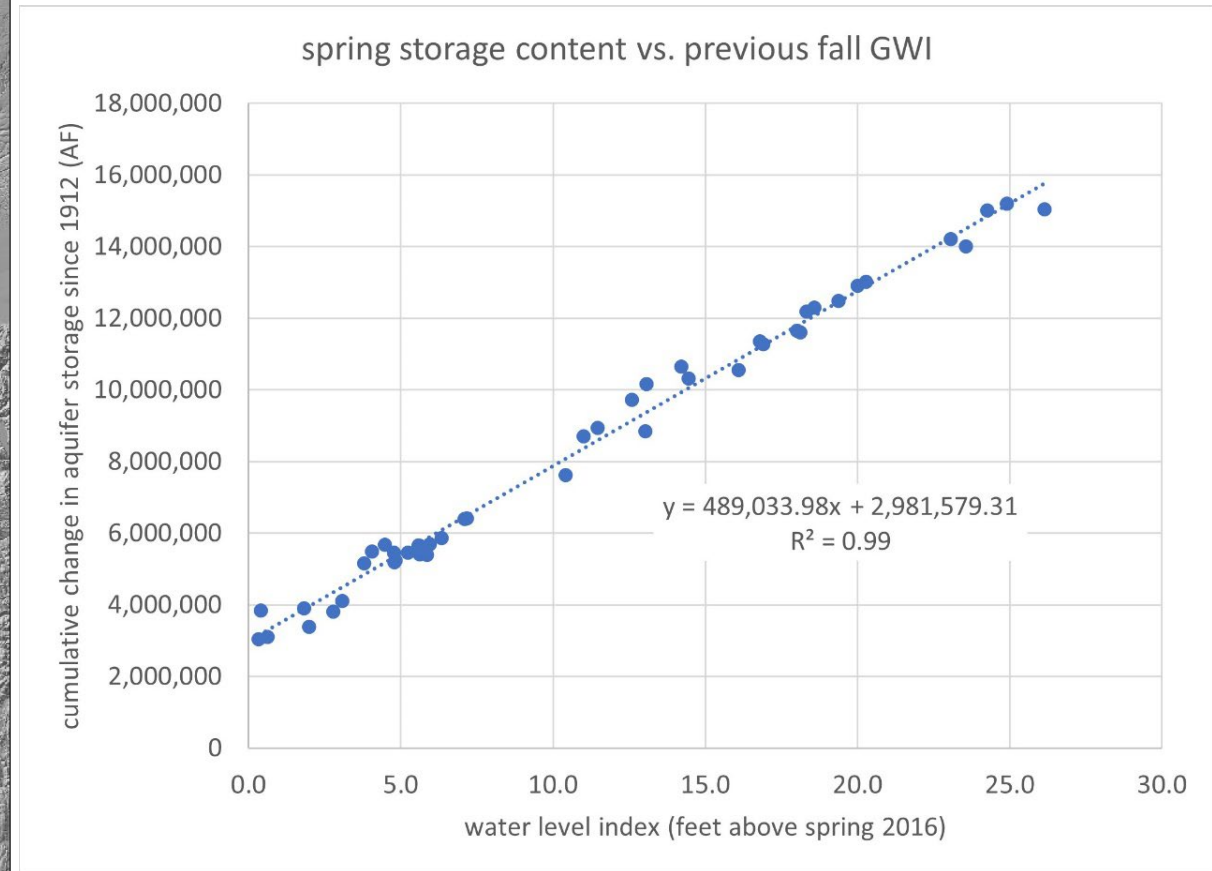
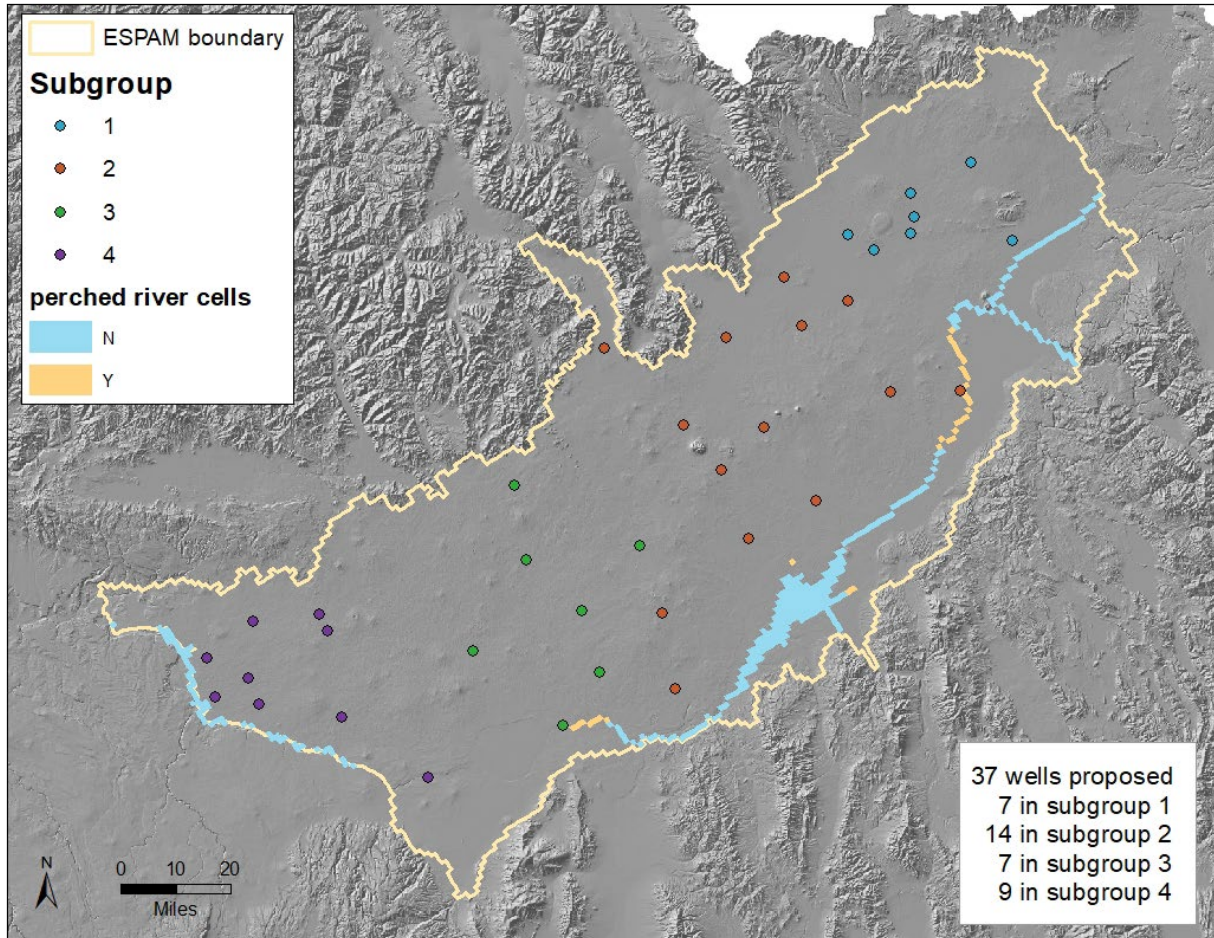
Year	Non-ESPA (cfs)	Consumptive Demand (cfs)	Net (cfs)	Date of observed min max
2003	803	1804	-1001	7/4
2007	824	1780	-956	7/1
2002	915	1817	-902	7/12
2013	935	1817	-881	7/25
2014	983	1817	-834	7/16
2005	999	1817	-818	7/21
2022	974	1786	-812	7/9
2004	891	1668	-778	7/28
2012	1035	1804	-769	7/1
2021	958	1727	-768	7/1
2015	1068	1817	-749	7/2
2008	1046	1780	-733	7/12
2006	1083	1792	-709	7/22
2010	1171	1817	-646	7/22
2020	1406	2026	-620	7/15
2016	1227	1817	-590	7/22
2018	1272	1727	-454	7/2
2009	1228	1631	-404	7/22
2019	1522	1549	-27	7/31
2017	1414	1267	147	7/23
2011	1497	1211	285	7/29
minimum non-ESPA inflow and maximum demand	796	2050	-1254	7/3/2003 & 7/14/2020



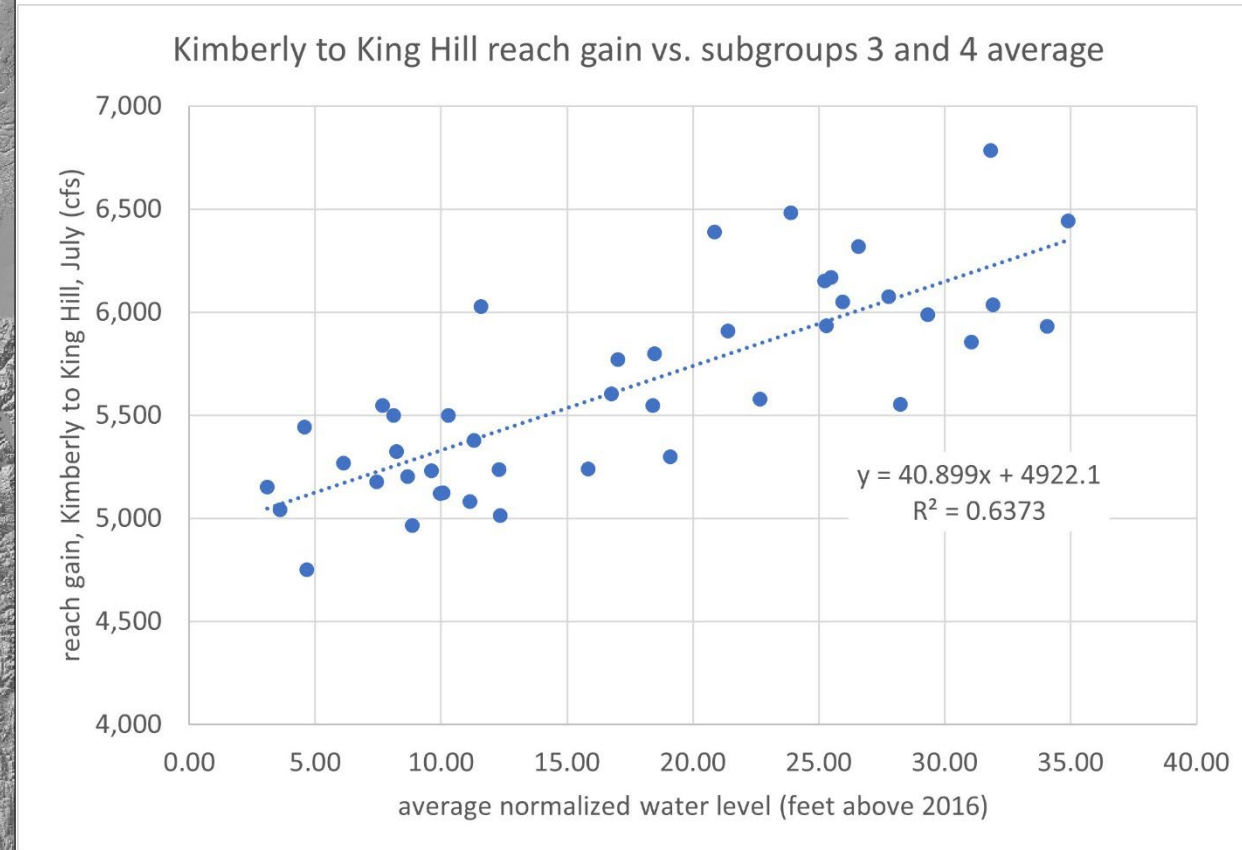
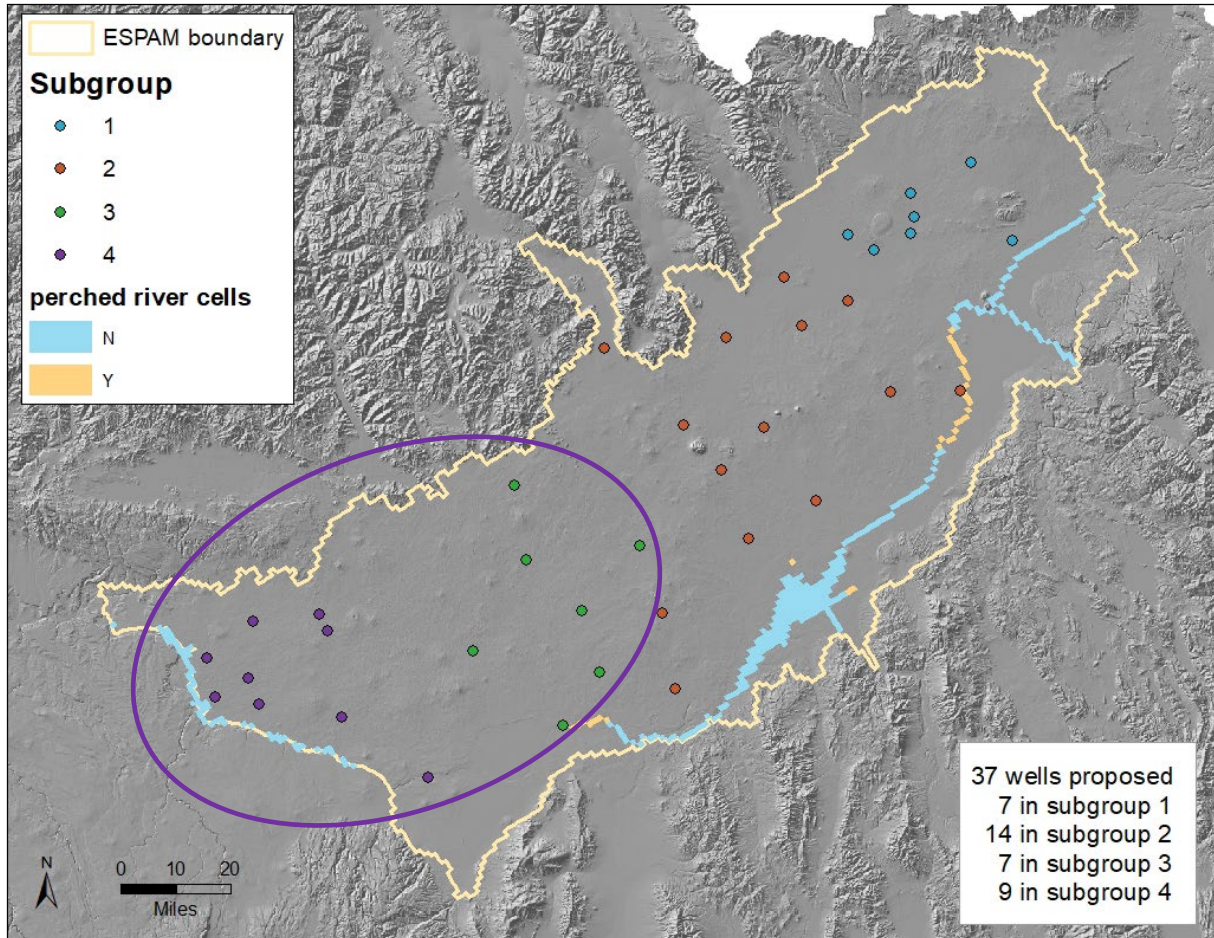
Indicator well network for monitoring ESPA water levels



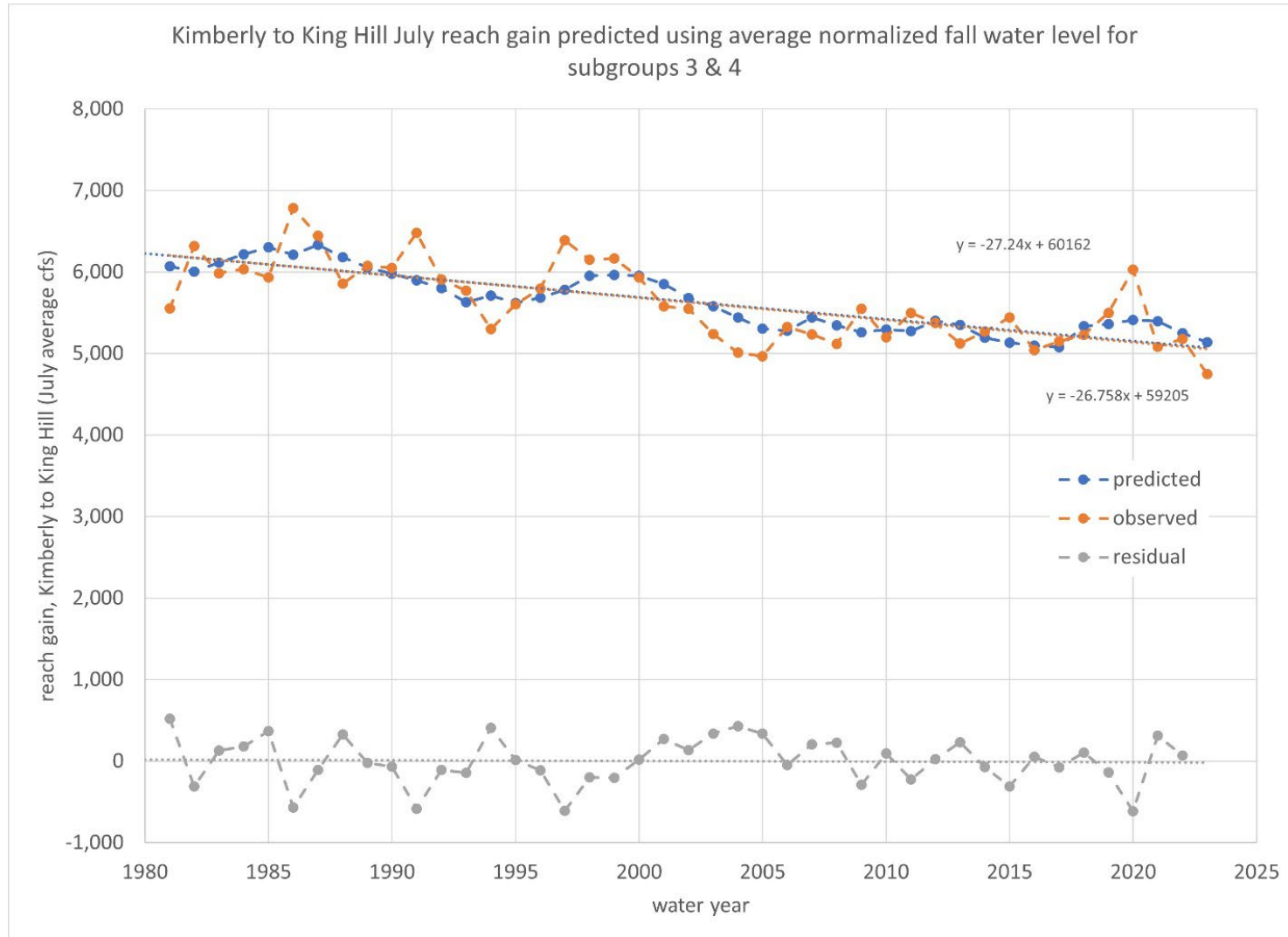
Indicator well network for monitoring ESPA water levels



Correlation subset of indicator water levels with ESPA discharge



Predicting July ESPA discharge using fall indicator water levels



Residual difference between observed and predicted reach gain reflects prediction uncertainty due to:

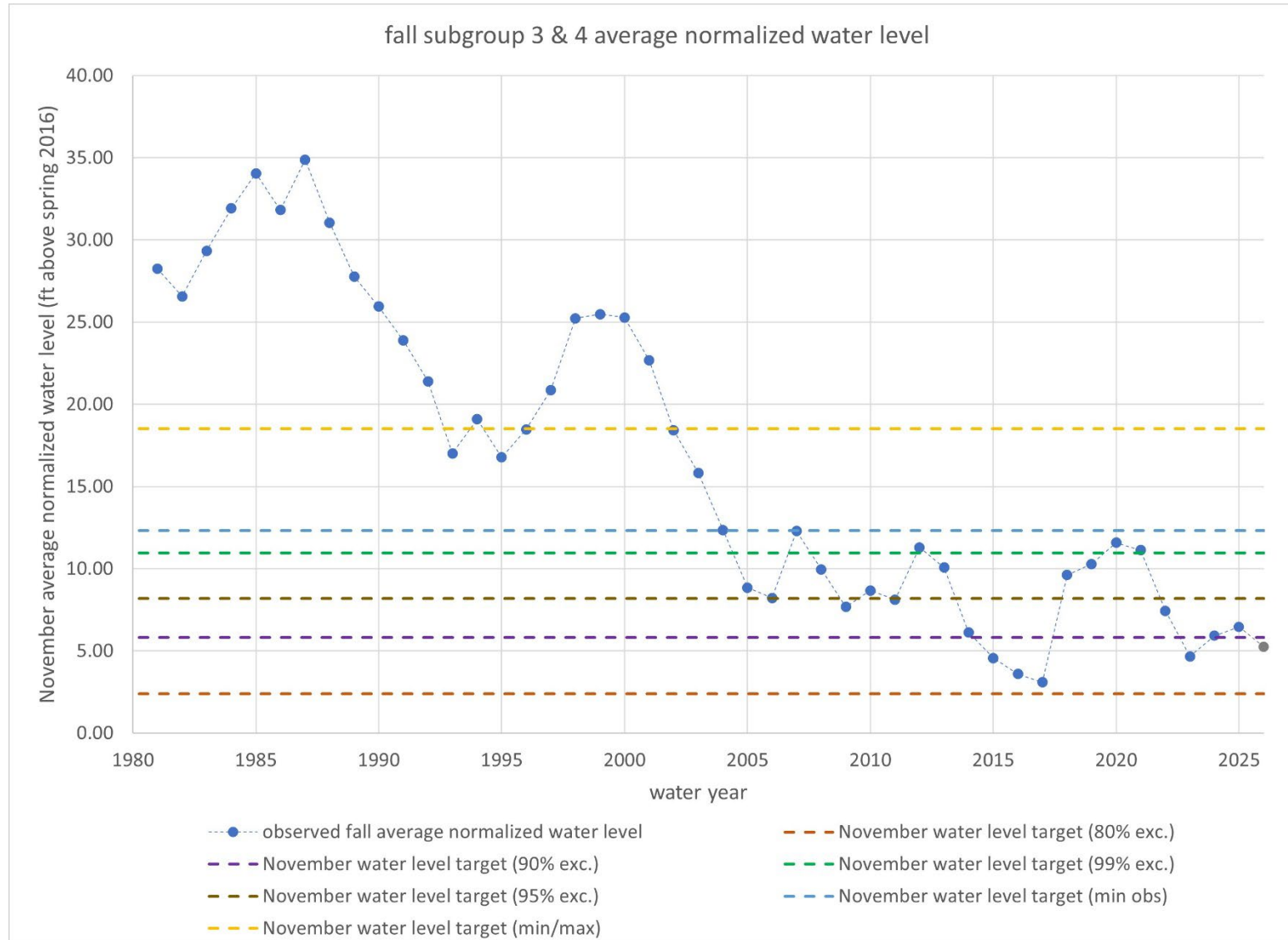
- Year-to-year differences in aquifer recharge and pumping withdrawals occurring between fall and the following July
- Measurement error in gaged river flow, inflows, and reported diversion data used to calculate reach gain
- Estimation of unmeasured return flows prior to 2005
- Timing of historic fall water level measurements
- Measurement error in water levels
- Simplification of using 16 water levels to represent aquifer water level status

Potential minimum targets for average fall subgroup 3 & 4 water levels

Table 5. Potential targets for minimum fall normalized subgroup 3 & 4 water level average				
Scenario	Net non-ESPA contribution (cfs)	ESPA contribution goal (cfs)	ESPA flow prediction residual (cfs) (predicted July discharge less observed July discharge)	Target November subgroup 3 & 4 average normalized water level (ft)*
80% exceedance	-834	4,734	286	> 2.4
90% exceedance	-902	4,802	358	> 5.8
95% exceedance	-956	4,856	401	> 8.2
99% exceedance	-992	4,892	479	> 11.0
minimum observed	-1,001	4,901	525	> 12.3
minimum non-ESPA inflow and maximum demand	-1,254	5,154	525	> 18.5

*Average normalized water level is feet above the Spring 2016 average level. For reference, the fall 2025 average normalized water level for subgroups 3 & 4 was 5.25 feet. The lowest recorded fall value was 3.1 feet in fall 2016.

Potential minimum targets for average fall subgroup 3 & 4 water levels



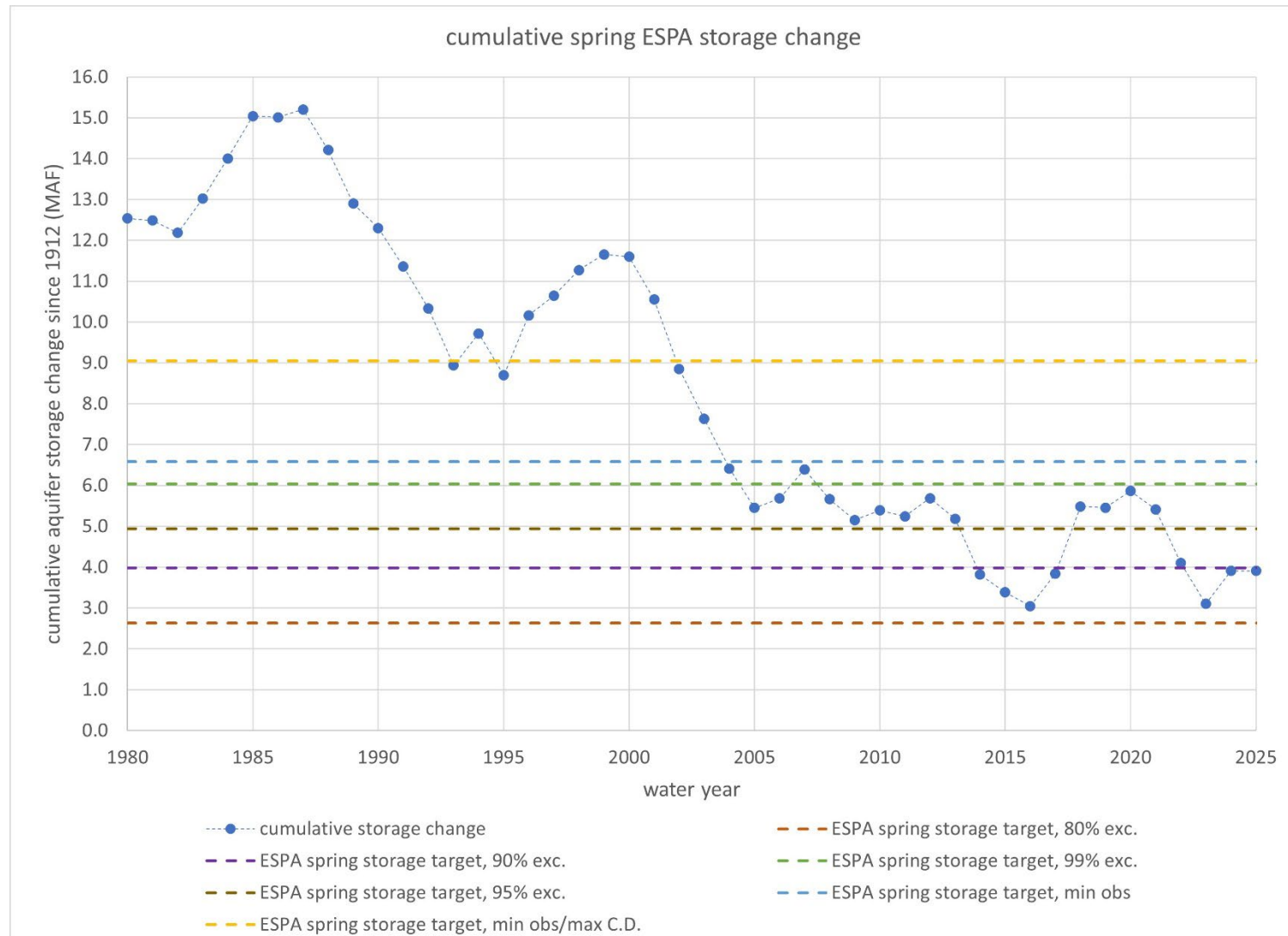
Potential minimum targets correlated with greater ESPA

Table 6. Potential minimum targets for subgroups 3 & 4 correlated with greater ESPA

Scenario	Target November subgroup 3 & 4 level(ft)	ESPA November GWI (ft)	ESPA April GWI (ft)	ESPA storage change from 1912 (Sy = 0.075, MAF)
80% exceedance	> 2.4	> -0.7	> -0.7	> 2.6
90% exceedance	> 5.8	> 2.1	> 1.9	> 4.0
95% exceedance	> 8.2	> 4.0	> 3.8	> 4.9
99% exceedance	> 11.0	> 6.3	> 5.9	> 6.0
minimum observed	> 12.3	> 7.4	> 7.0	> 6.6
minimum non-ESPA inflow and maximum demand	> 18.5	> 12.4	> 11.8	> 9.0

*Average normalized water level is feet above the Spring 2016 average level. For reference, the spring 2025 cumulative ESPA storage change estimate was 3.9 MAF. The lowest recent estimates were 3.05 MAF in spring 2016 and 3.10 MAF in spring 2023.

Potential minimum targets correlated with greater ESPA



Assessing risk of not meeting minimum summer streamflow

Table 10. Range of net risk of not meeting the minimum summer streamflow

Scenario	Target November subgroup 3 & 4 level(ft)	Range of net risk
80% exceedance	> 2.4	4% to 20%
90% exceedance	> 5.8	1% to 10%
95% exceedance	> 8.2	0.25% to 5%
99% exceedance	> 11.0	0.01% to 1%
minimum observed	> 12.3	very low
minimum non-ESPA inflow and maximum demand	> 18.5	extremely low

- Risk of low non-ESPA contributions
- Risk of July ESPA discharge being lower than predicted by correlation with fall water level
- Risks are neither entirely independent nor entirely dependent

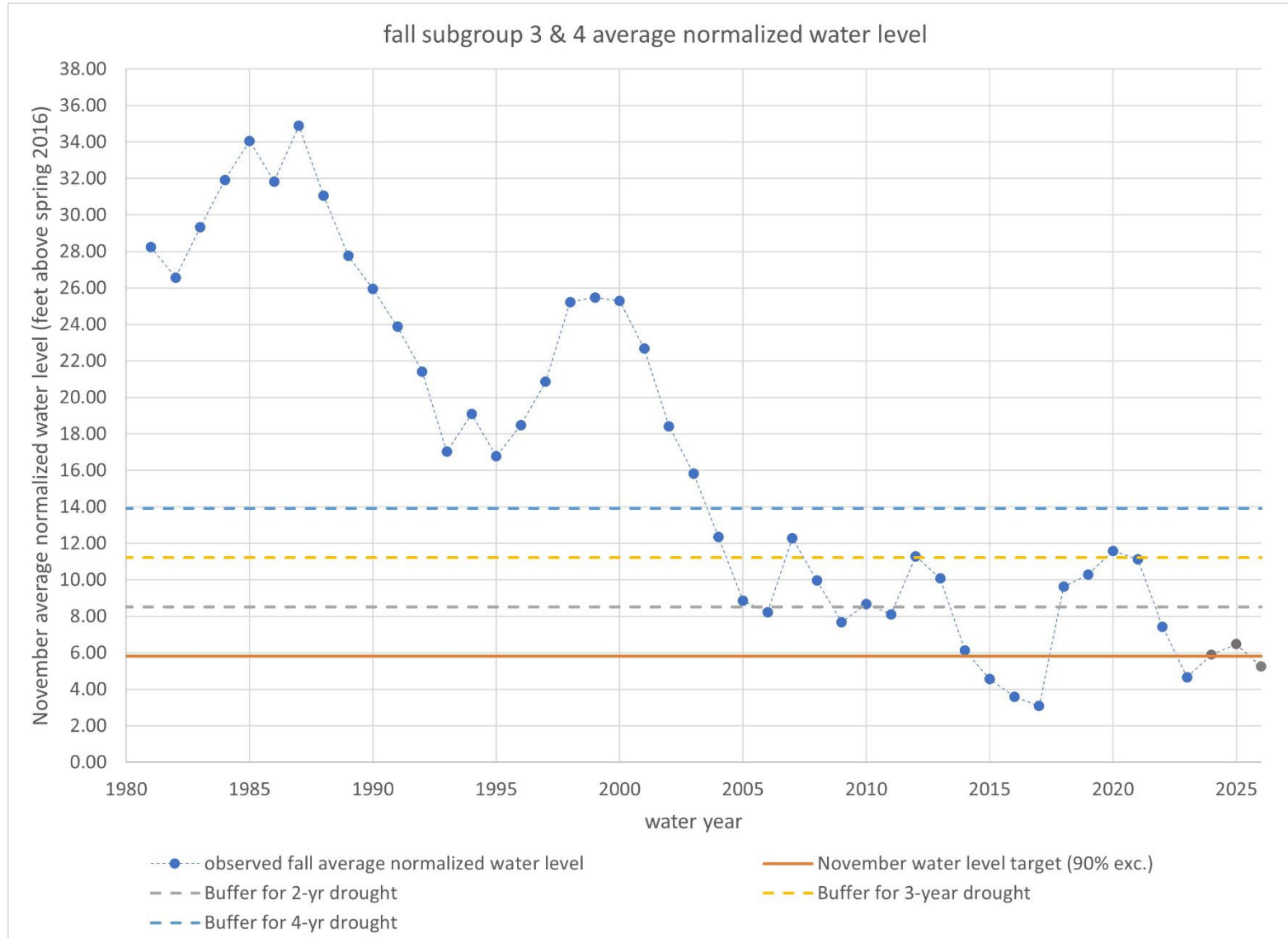
Water level change during multi-year droughts

- If the aquifer is at the minimum fall water level target and an extreme drought year occurs, extreme changes in water management practices would be needed to meet the fall water level target again in the fall.
- Alternatively, a buffered target water level could be selected to account for declines in aquifer water levels that are expected to occur during successive drought years.

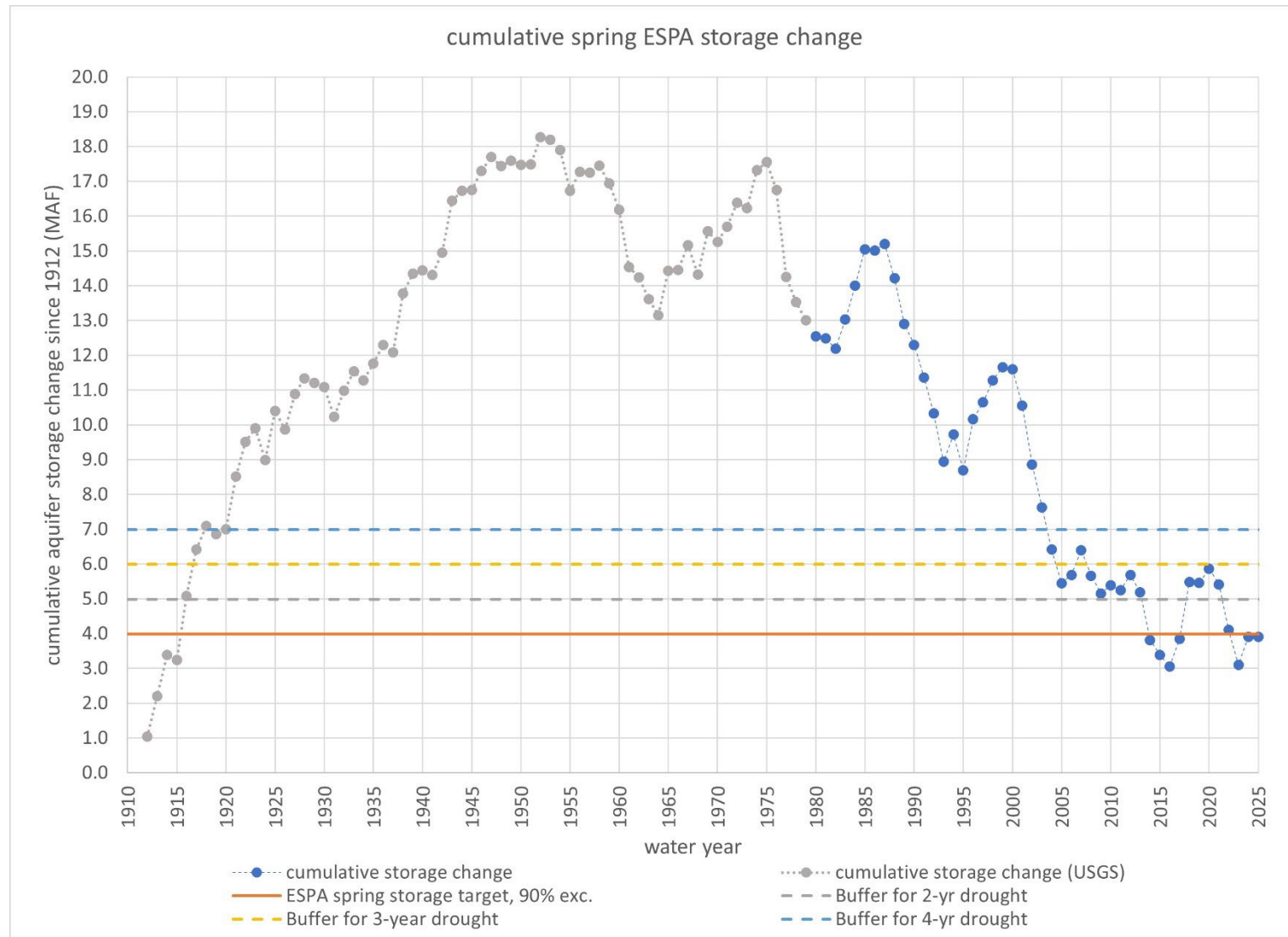
Table 7. Historic declines in ESPA storage and water levels during recent multi-year droughts

Drought period	Years	subgroups 3&4 fall water level change (ft)	ESPA fall GWI change (ft)	ESPA spring storage change (MAF)
1987 - 1992	6	-17.9	-13.4	-6.3
2000 - 2004	5	-16.4	-13.4	-6.2
2012 - 2015	4	-7.7	-5.6	-2.6
2020 - 2022	3	-6.9	-5.7	-2.7
average change during drought years	18 years	-2.7 ft/yr	-2.1 ft/yr	-1.0 MAF/yr

Example of buffering for additional consecutive drought years



Example of buffering for additional consecutive drought years



Questions and Discussion

Question 5: “Analysis of the necessary ESPA levels required to maintain the minimum flow rate at the Snake River nr Murphy Gage during the low flow period”